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(54) Improvements relating to hand wrenches

(57) A hand wrench has a jaw (13) welded to each handle (11). The sintered jaw 13 is located on a platform on the handle 11 one of these items having projections to enable them to be projection welded together. To overcome the adverse effects of welding, the jaw has a lower than usual carbon content, and it may also include molybdenum and nickel. Annealing is carried out by applying a current lower then that used for welding, over a longer period.

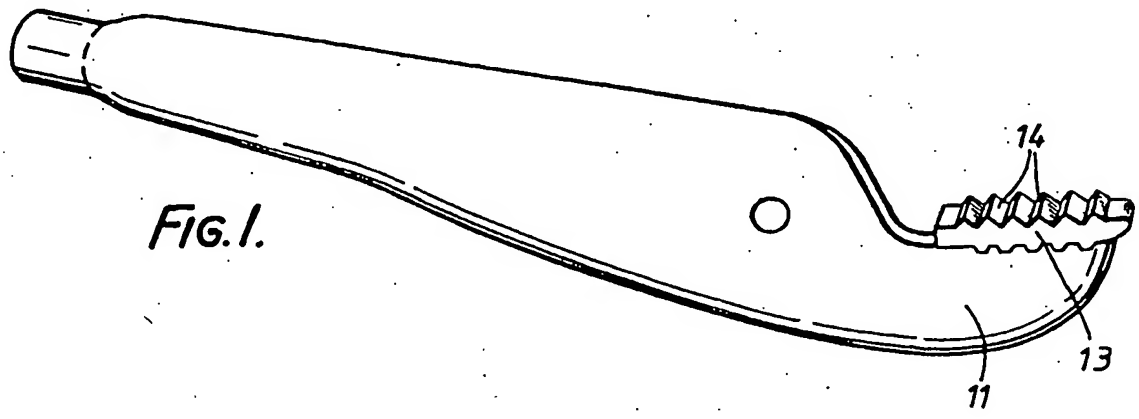

FIG. 1.

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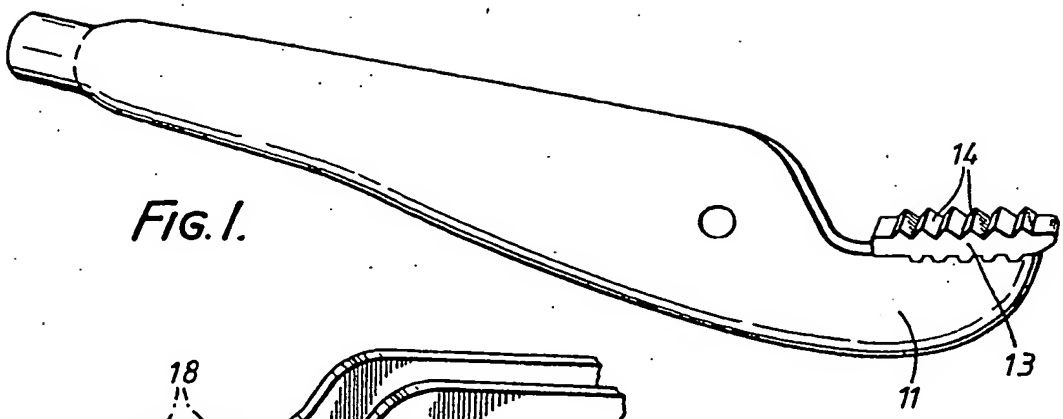

FIG. 1.

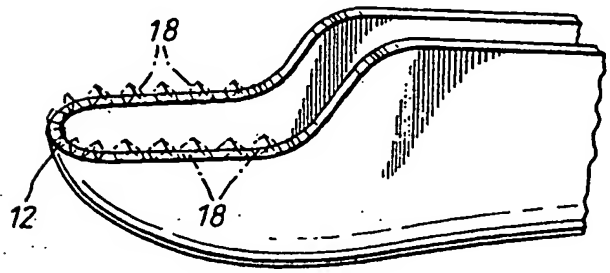

FIG. 2.

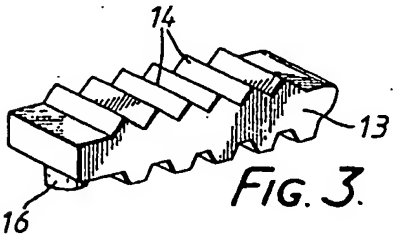

FIG. 3.

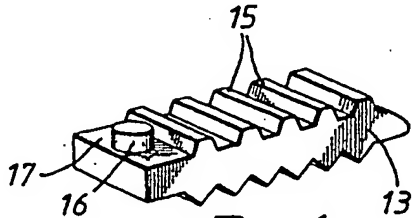

FIG. 4.

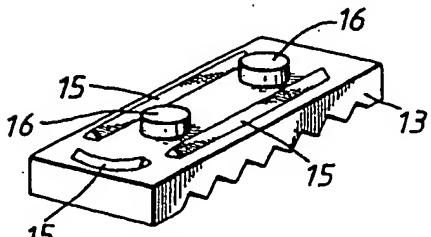

FIG. 5.

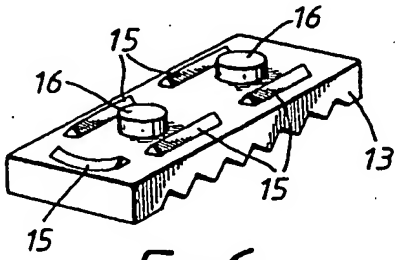

FIG. 6.

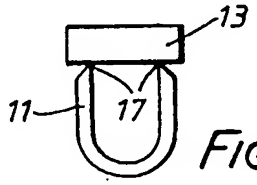

FIG. 7.

SPECIFICATION

Improvements relating to hand wrenches

This invention relates to hand wrenches and in particular self-locking hand wrenches.

Such wrenches are generally provided with toothed jaws which are normally manufactured separately and then welded to respective handle portions of the wrench. The jaws require different properties from the handles and are quite difficult to manufacture. It has been proposed that they should be sintered, but this presents considerable problems because the welding process tends to embrittle them and the surrounding handle portion, making it likely that the jaws will fracture under the very high forces which can be generated in such wrenches. In addition, the accuracy of location of the jaws has often been unsatisfactory to date.

It is an object of the invention to provide an improved wrench in which one or more of these problems is reduced or overcome.

According to the present invention there is provided a hand wrench having a steel handle with a platform upon which is mounted a jaw of sintered material, at least one of the co-operating surfaces of the platform and jaw having a projecting formation to engage the other co-operating surface, the handle and jaw being projection welded together.

In a preferred embodiment the weld has been subjected to a second pass of a lower current for a longer time than used in the weld operation, to anneal the weld.

Conveniently the platform is generally U-shaped. Its surface may be flat, in which case the jaw will have projections to engage it. Alternatively, it may be angled in cross-section to provide a knife edge to engage the jaw. Another possibility is for the platform surface to have projections along its length to engage the jaw.

Preferably, locating means will be provided on the jaw to engage within the U-shape of the platform.

It is preferred that the carbon content of the jaw is in the range 0.25 to 0.5% by weight and the range 0.3 to 0.4% by weight is particularly suitable. The jaw may also include molybdenum to 1% by weight and nickel 7 to 9% by weight.

The carbon content of the handle preferably lies in the range 0.35 to 0.45% by weight and the range 0.40 to 0.45% by weight is most suitable. The handle may also contain manganese in the range 0.6 to 1.0% by weight.

The invention may be performed in various ways and some embodiments will now be described, by way of example, with reference to the accompanying drawing, in which:

Figure 1 is a side view of a handle and jaw of a hand wrench,

Figure 2 is an enlarged perspective view of one end of the handle with the jaw removed,

Figure 3 is a view from above and one side of a jaw before fixing to a handle,

Figure 4 is a view from beneath and the other side of the jaw of Fig. 3,

Figures 5 and 6 are rear perspective views of alternative forms of jaw, and

Figure 7 is a cross-section of a jaw being mounted on a modified handle.

A handle 11 of a hand wrench is fabricated from steel strip bent into an elongated substantially U-section member to define, at its jaw end, a platform 12. The platform is generally U-shaped and is of the thickness of the metal. A jaw 13 is provided with a series of gripping teeth 14 on its exposed working face and a series of longitudinally spaced transverse projections 15 along its back face, which also has a lug 16 at one end to locate in the bight of the U of the platform 12.

The jaw 13 is located on the platform 12 by the lug 16 and it is then projection welded to the platform so that the projections 15 penetrate into the material of the handle 11.

Different patterns of projections 15 and lugs 16 may be used and two examples are hown in Figs. 5 and 6.

As mentioned above, it is not simple to form such a weld satisfactorily and attempts to date have not generally been successful. Surprisingly, it has been discovered that the weld can be very greatly improved if the carbon content of the jaw is reduced from typical current materials (which have a carbon content of the order of 0.9% by weight) to a range of 0.25 to 0.5% by weight and in particular 0.3 to 0.4% by weight. At the same time there can be a molybdenum content up to 1% by weight and nickel 7 to 9% by weight. Previously it had been thought that steel with such composition would be unacceptable because of the strength required from the jaw.

The weld can also be improved by correspondingly reducing the carbon content of the handle (which is normally of the order of at least 0.45% by weight) to a range of 0.35 to 0.45% by weight and preferably to 0.40 to 0.45% by weight. Manganese in the range 0.6 to 1.0% by weight may also be introduced.

Despite these changes in material a certain amount of embrittlement will be experienced as a result of the welding operation. Contrary to expectation it has been found that this embrittlement can be removed or greatly reduced by subjecting the weld to a further current at a lower level and over a longer time than the original welding current. Care needs to be taken with the levels of current and time taken for this second pass because the annealing process could cause reduction in the hardness of the teeth 14. In one example it was found that a current of 14870 amperes with 18 cycles of weld time produced a satisfactory weld. This was from a mains demand

of some 100 kv amps. The second (annealing) current was found to be most satisfactory at 6935 amps with 50 cycles of weld time.

As an alternative to having the projections 15 on the jaw resting on a flat surface provided by the platform 12, the arrangement may be reversed. Thus the platform 12 may be modified as shown in Fig. 7 by being ground at an angle, say 45°, to provide a U-shaped knife edge 17 on which the jaw 13 will rest. The projections 15 may no longer be provided, but there will preferably still be locators such as the lugs 16. When the current is applied, this edge 17 will "bite" into the jaw and form a good weld.

Alternatively, the platform 12 may be provided, conveniently in the cutting of the original blank, with a series of teeth, these being indicated in outline by 18 in Fig. 2. Again, these will "bite" into the jaw when the welding current is turned on and make a fast joint.

It will be understood that although only one jaw/handle assembly has been described, a wrench normally has two such assemblies mutually pivoted together, and both may be constructed as described above.

CLAIMS

1. A hand wrench having a steel handle with a platform upon which is mounted a jaw of sintered material, at least one of the co-operating surfaces of the platform and jaw having a projecting formation to engage the other co-operating surface, the handle and jaw being projection welded together.

2. A wrench as claimed in claim 1, wherein the weld has been subjected to a second pass of a lower current for a longer time than used in the weld operation, to anneal the weld.

3. A wrench as claimed in claim 1 or 2, wherein the platform is generally U-shaped.

4. A wrench as claimed in claim 3, wherein the platform surface is flat and the jaw has projections which engage it.

5. A wrench as claimed in claim 3, wherein the platform surface is angled in cross-section to provide a knife edge to engage the jaw.

6. A wrench as claimed in claim 3, wherein the platform surface has projections along its length to engage the jaw.

7. A wrench as claimed in any one of claims 3 to 6, wherein locating means are provided on the jaw to engage within the U shape of the platform.

8. A wrench as claimed in any preceding claim, wherein the carbon content of the jaw is in the range 0.25 to 0.5% by weight.

9. A wrench as claimed in claim 8, wherein the carbon content of the jaw is in the range 0.3 to 0.4% by weight.

10. A wrench as claimed in any preceding claim, wherein the jaw contains molybdenum up to 1% by weight.

11. A wrench as claimed in any preceding claim, wherein the jaw contains nickel in the range 7 to 9% by weight.

12. A wrench as claimed in any preceding claim, wherein the carbon content of the handle is in the range 0.35 to 0.45% by weight.

13. A wrench as claimed in claim 12, wherein the carbon content of the handle is in the range 0.40 to 0.45% by weight.

14. A wrench as claimed in claim 13, wherein the handle contains manganese in the range 0.6 to 1.0% by weight.

15. A hand wrench as claimed in any preceding claim, wherein there are two such co-operating jaws mounted on respective handles.

16. A hand wrench substantially as hereinbefore described with reference to the accompanying drawing.

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